

Claims

1 1. A rechargeable cathode comprising a cathode paste containing at least about 60%
2 by weight MnO₂ and at least about 2% by weight of a hydrophobic polymer, wherein the
3 MnO₂ consists essentially of electrochemically synthesized MnO₂.

1 2. The cathode of claim 1, wherein the cathode paste contains at least about 3% by
2 weight of a hydrophobic polymer.

1 3. The cathode of claim 1, wherein the cathode paste contains at least about 4% by
2 weight of a hydrophobic polymer.

1 4. The cathode of claim 1, wherein the cathode paste contains at least about 5% by
2 weight of a hydrophobic polymer.

1 5. The cathode of claim 1, wherein the cathode paste contains at least about 6% by
2 weight of a hydrophobic polymer.

1 6. The cathode of claim 1, wherein the cathode paste contains at least about 7% by
2 weight of a hydrophobic polymer.

1 7. The cathode of claim 1, wherein the cathode paste contains at least about 70% by
2 weight MnO₂.

1 8. The cathode of claim 7, wherein the cathode paste contains at least about 80% by
2 weight MnO₂.

1 9. The cathode of claim 8, wherein the cathode paste contains at least about 85% by
2 weight MnO₂.

1 10. The cathode of claim 9, wherein the cathode paste contains at least about 90% by
2 weight MnO₂.

1 11. The cathode of claim 1, wherein the cathode paste contains 1-15% by weight
2 carbon.

1 12. The cathode of claim 1, wherein the hydrophobic polymer is
2 polytetrafluoroethylene.

1 13. The cathode of claim 1, wherein the packing density of the cathode is
2 substantially the same at opposite ends of the cathode.

1 14. The cathode of claim 1, wherein the cathode includes a current collector.

1 15. An air recovery battery comprising:
2 (a) a container having an air access port;
3 (b) a cathode comprising a cathode paste containing at least about 60% by weight
4 MnO₂, wherein the MnO₂ consists essentially of electrochemically synthesized MnO₂;
5 (c) an anode comprising zinc; and
6 (d) a separator between the cathode and the anode.

1 16. The battery of claim 15, wherein the cathode paste contains at least about 70% by
2 weight MnO₂.

1 17. The battery of claim 16, wherein the cathode paste contains at least about 80% by
2 weight MnO₂.

1 18. The battery of claim 17, wherein the cathode paste contains at least about 85% by
2 weight MnO₂.

1 19. The battery of claim 18, wherein the cathode paste contains at least about 90% by
2 weight MnO₂.

1 20. The battery of claim 15, wherein the cathode paste contains at least about 2% by
2 weight of a hydrophobic polymer.

1 21. The battery of claim 20, wherein the cathode paste contains at least about 3% by
2 weight of a hydrophobic polymer.

1 22. The battery of claim 21, wherein the cathode paste contains at least about 4% by
2 weight of a hydrophobic polymer.

1 23. The battery of claim 22, wherein the cathode paste contains at least about 5% by
2 weight of a hydrophobic polymer.

1 24. The battery of claim 23, wherein the cathode paste contains at least about 6% by
2 weight of a hydrophobic polymer.

1 25. The battery of claim 24, wherein the cathode paste contains at least about 7% by
2 weight of a hydrophobic polymer.

1 26. The battery of claim 15, wherein the cathode further comprises a current
2 collector.

1 27. The battery of claim 15, wherein the battery is a cylindrical battery.

1 28. The battery of claim 27, wherein the battery is a AAA battery.

1 29. The battery of claim 27, wherein the battery is a AA battery.

1 30. The battery of claim 27, wherein the battery is a C battery.

1 31. The battery of claim 27, wherein the battery is a D battery.

1 32. The battery of claim 15, wherein the battery is a prismatic battery.

1 33. The battery of claim 15, wherein the battery is a racetrack battery.

34. A method for making an air recovery battery, the method comprising:

(a) combining MnO_2 , carbon, and a binder to form a cathode paste, wherein the MnO_2 consists essentially of electrochemically synthesized MnO_2 , and wherein the cathode paste contains at least about 60% by weight MnO_2 ;

(b) spreading the cathode paste on a current collector to form a cathode;

(c) inserting the cathode into a container, wherein the container includes an air access port;

(d) inserting anode material into the container, wherein the anode material comprises zinc; and

(e) sealing the container.

35. The method of claim 34, wherein the cathode paste contains at least about 70% by weight MnO_2 .

36. The method of claim 35, wherein the cathode paste contains at least about 80% by weight MnO_2 .

37. The method of claim 36, wherein the cathode paste contains at least about 85% by weight MnO_2 .

38. The method of claim 37, wherein the cathode paste contains at least about 90% by weight MnO_2 .

39. A method for making a rechargeable cathode, the method comprising:

(a) combining a catalyst, carbon particles, and a solvent to form a mixture;

(b) combining the mixture with a hydrophobic polymer at a temperature below about 10°C to form a paste;

(c) stirring the paste at a temperature below about 10°C ; and

(d) warming the paste to at least about 20°C and mixing the paste at this temperature.

40. The method of claim 39, wherein step (c) comprises stirring the paste under vacuum.

1 41. The method of claim 39, wherein step (d) comprises stirring the paste under
2 vacuum.

1 42. The method of claim 39, wherein step (c) comprises stirring the paste at a speed
2 of about 15 rpm.

1 43. The method of claim 39, wherein step (d) comprises stirring the paste at a speed
2 of about 15 rpm.

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